

Executive Summary

The goal of this study was to assess the effects of road runoff on freshwater mussels in North Carolina streams. We 20 road crossings in the upper Neuse River Basin above Falls Lake as the study area. Using GIS, we selected 9 agricultural sites and 10 forested sites based on EPA landuse data. A 20th site was selected because of its urban nature and ongoing construction at the site. We surveyed mussels in the 300-meter reaches upstream and downstream of each of these crossings. We used hemolymph of the common mussel species *Elliptio complanata* as a non-lethal health assessment of individual mussels upstream and downstream of these road crossings. We used this technique not only to compare upstream and downstream of road crossings but also between agricultural and forested sites. This project was the first field test of this hemolymph technique, and the forested sites were used to develop reference ranges for the various parameters evaluated in the *E. complanata* hemolymph. Other health assessments included glycogen analysis, evaluation of the percent of gravid mussels at a site, and presence of parasites in the mussel. Contaminants were measured in mussel tissue, sediment, and in Passive Sampling Devices (PSDs) deployed at each site.

There tended to be fewer mussels in the first 50 meters downstream of the road crossings; however, there were no differences when the entire 300-meter upstream and downstream reaches were considered. Health evaluations showed no difference between upstream and downstream mussels. Hemolymph glucose and calcium were significantly different between agricultural and forested sites. Hemolymph reference ranges are presented in this report. Contaminant analyses showed an increase in polycyclic aromatic hydrocarbons (PAHs), and some metals downstream of all road crossings. This appeared to be directly related to the number of vehicles crossing the bridges. There was, however, no direct correlation between increasing contaminant loads and decreasing mussel abundance. There were no noteworthy differences in contaminant loads between land use types. Also PSDs proved to be excellent surrogates for the direct measurement of PAHs in mussel tissue.